07. Breeding value estimation

Quantitative Genetics Exercise, Universität Potsdam, Dr. Hao Tong

1. The productions were measured in a set of pigs from five random populations with two sexes, i.e. male and female. For sex and population factor, which is fixed effect / random effect? Please build the linear mixed model to estimate the fixed and random coefficients, i.e. BLUE and BLUP, respectively, of corresponding groups **in your won code according to the Handerson's equations** you learned from lecture. (Hint: variance components can be obtained using lmer() function firstly). Then compare with outputs from the fixef() and ranef() functions.

2. Assume individual 1 is the father and individual 2 is the mother of individual 3 and 4. Individual 1 and individual 2 are unrelated. Individual 5 is unrelated to individual 1 to 4 and is the mother of individual 6 and 7. The fathers of individual 6 and 7 are different. The body weights were measured in these seven individuals as 10, 20, 35, 38, 30, 24, 42. Given by additive variance is 30 and residual variance is 70, please estimate the breeding value of each individual **use both the Handerson's equations and the animal model equations**.

3. Assume individual 1 is the father and individual 2 is the mother of individuals 3 to 5. Individual 1 and individual 2 are unrelated. The body weights were measured in individual 1 and 3 to 5 as 42, 21, 26, 35, and individual 2 was missing. Given by additive variance is 30 and residual variance is 70, please estimate the breeding value of each individual. (Hint: use the Handerson's equations rather than the animal model)